Heaven's Light is Our Guide

Rajshahi University of Engineering& Technology

Department of Electrical & Computer Engineering

Course No: ECE 4124
Course Name: Digital Signal Processing Sessional

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Experiment Name: Signal Representation using MATLAB.

1. Plotting unit step, unit impulse and unit ramp signal using conditions.
2. Plotting a random discrete signal.
3. Plotting two discrete signal, their addition and subtraction.
4. Plotting two given continuous signal.

Theory: In the experiment, continuous and discrete signals are classified through different conditions representing on matlab code.

Continuous signal: A signal is considered to be a continuous time signal if it is defined over a continuum of the independent variable. A signal is considered to be discrete time if the independent variable only has discrete values.

Discrete Signal: The time instants at which the signal is defined are the signal's sample times, and the associated signal values are the signal's samples.

Unit step: A step input signal has an initial value of 0 and transitions to a specified step size value after a specified step time. When performing frequency response estimation, step inputs are quick to simulate and can be useful as a first try when you do not have much knowledge about the system you are trying to estimate

Unit Impluse: An ideal impulse function is a function that is zero everywhere but at the origin, where it is infinitely high. However, the area of the impulse is finite. This is, at first hard to visualize but we can do so by using the graphs shown below.

Unit Ramp:A ramp function or ramp signal is a type of standard signal which starts at $t = 0$ and increases linearly with time. The unit ramp function has unit slop. It is denoted by r(t).

Required software: MATLAB

Code:

Code 1: Unit step, unit impulse and unit ramp-

```
clc;
clear all;
close all;

t=-7:0.0001:7;
step1= t>= 0;
step2= t==0;
step3= (t>=0).*t;

subplot(3,1,1);
plot(t,step1);
```

```
xlabel('Time');
ylabel('Amplitude');
title('Unit step');


subplot(3,1,2);
plot(t,step2);
xlabel('Time');
ylabel('Amplitude');
title('Unit Impluse');


subplot(3,1,3);
plot(t,step3);
xlabel('Time');
ylabel('Amplitude');
title('Unit ramp');
```

Code 2: Discrete signal -

```
clc;
clear all;
close all;

y=[2, 0, -2, 3, 1, 4, 6];
n=[1 2 4 5 6 8 3];
stem(n,x);
xlabel('n');
ylabel('y');
xlim([0, 9]);
ylim([-3, 7]);

```

Code 3: Two different signals, their addition and subtraction-

```
clc;
clear all;
close all;

t=-7:1:18;
step1= t>=0 & t<=10;

subplot(4,1,1);
stem(t,step1);
xlabel('Time');
ylabel('Amplitude');
title('1st signal');

 step2= t>=5 & t<=15;

```

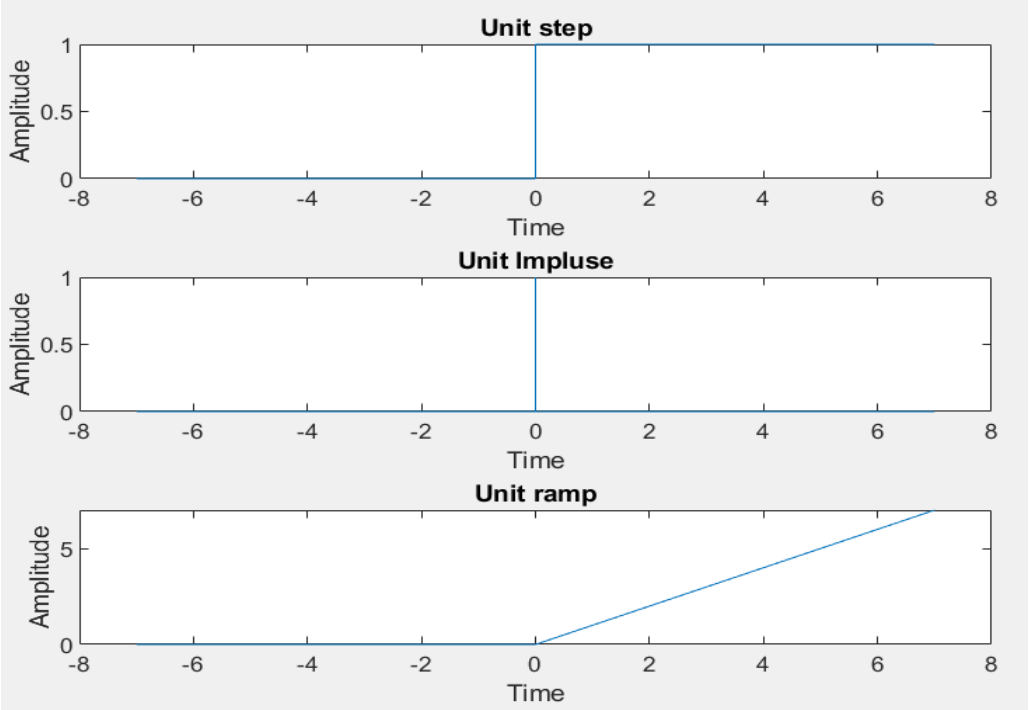
```
subplot(4,1,2);
stem(t,step2);
xlabel('Time');
ylabel('Amplitude');
title('2nd signal');

step3 = step1+step2
subplot(4,1,3);
stem(t,step3);
xlabel('Time');
ylabel('Amplitude');
title('Addition');

step4 = step1-step2
subplot(4,1,4);
stem(t,step4);
xlabel('Time');
ylabel('Amplitude');
title('Subtraction');
```

Code 4: Presentation of two signals-

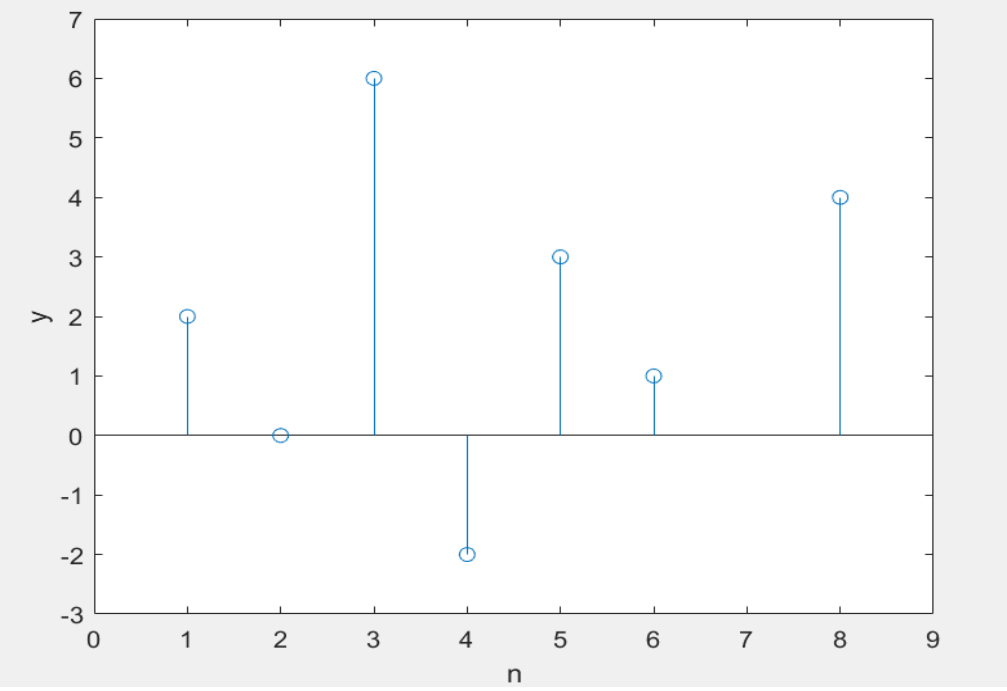
```
clc;
clear all;
close all;

t=0:1:7;
x = [ones(1,1).*1 ones(1,2).*2 ones(1,1).*4 ones(1,1).*4 ones(1,2).*2 ones(1,1)];
subplot(2,1,1);
plot(t,x);
xlabel('Time');
ylabel('Amplitude');
title('Signal 1');
xlim=([0, 8]);
ylim([1, 5]);

t=0:1:6;
x1 = [zeros(1,1) ones(1,5) zeros(1,1)];
subplot(2,1,2);
plot(t,x1);
xlabel('Time');
ylabel('Amplitude');
title('Signal 2');
xlim=([-0, 7]);
ylim([0, 1.1]);
```

Output Graph:

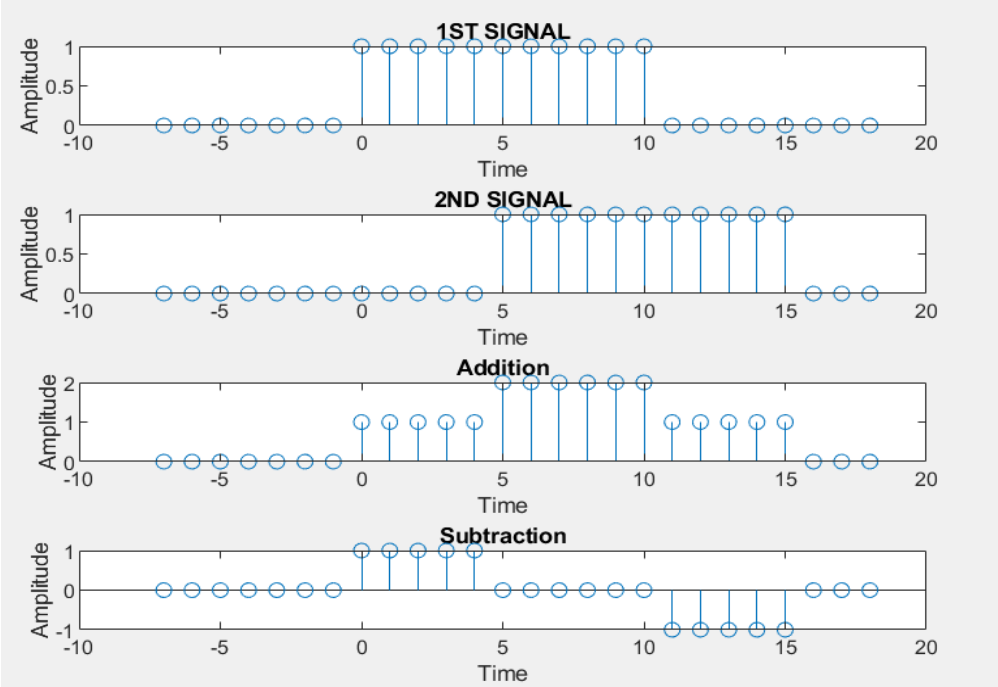
Output 1: Unit step, unit impulse and unit ramp-



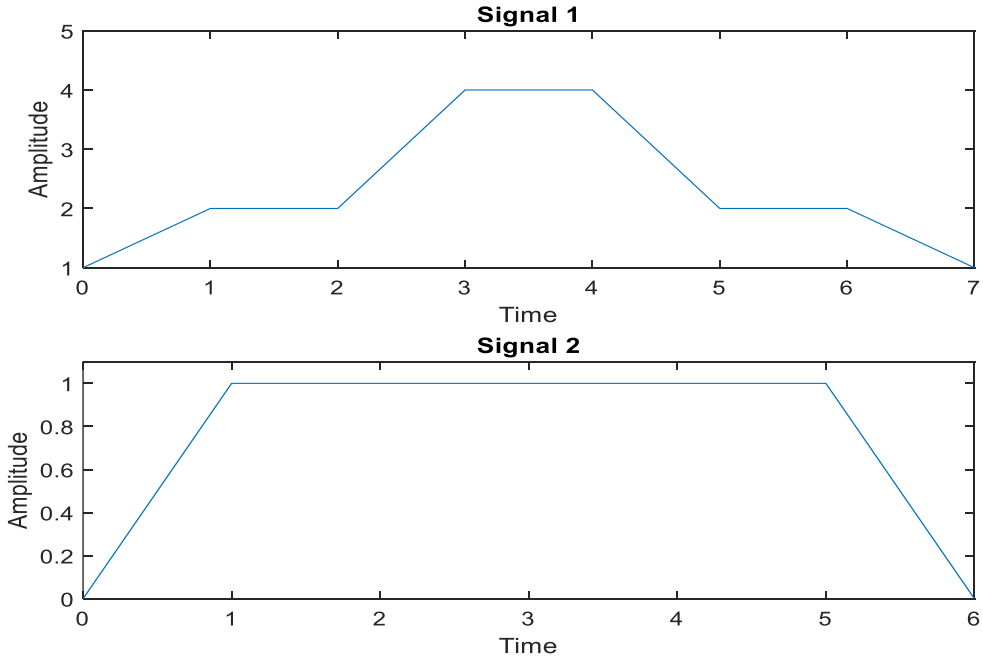
Output 2: Discrete signal –



Output 3: Two different signals, their addition and subtraction-



Output 4: Presentation of two signals-



Discussion: In this experiment,at 1st signal -unit step,unit impulse and unit ramp functions are presented by the conditions. For unit step before time zero all values are zero and after time zero all are one. For impulse only one value at zero, otherwise zero values. Discrete plot was defined by using stem function.Another representation is plotting 2 different signals following specific conditions. In last code the exact output was not found but approximate result is represented in the report.

Conclusion: By the experiment, we have learned to plot different continuous and discrete functions according to the given conditions. The matlab codes displayed exact output graphs which were matched with the theory and particular functions.